

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference SYN 60000/WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 03/04622	International filing date (day/month/year) 23.10.2003	Priority date (day/month/year) 07.11.2002
International Patent Classification (IPC) or both national classification and IPC C01B3/38		
Applicant JOHNSON MATTHEY PLC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 07.06.2004	Date of completion of this report 27.01.2005
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Harf-Bapin, E Telephone No. +49 89 2399-7813 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/GB 03/04622**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*):

Description, Pages

1-14 as originally filed

Claims, Numbers

1-6 as originally filed

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-6
	No: Claims	
Inventive step (IS)	Yes: Claims	1-6
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-6
	No: Claims	

2. Citations and explanations

see separate sheet

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EXAMINATION REPORT - SEPARATE SHEET**

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Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following documents:

D1: EP-A-0 516 441 (BRITISH PETROLEUM CO PLC) 2 December 1992 (1992-12-02)

D1 is regarded as being the closest prior art to the subject-matter of claim 1 and discloses (see page 1, lines 33-57 ; page 4 lines 15-46 and claims 1,4-6 and figure 3) a process for the production of hydrogen comprising the following steps:

- i) splitting preheated natural gas into two streams,
- ii) mixing the first stream with steam, passing the mixture in a convective reformer containing a catalyst,
- iii) mixing the product gas emerging from the reformer with the second stream of preheated natural gas,
- iv) reacting the mixed gases with oxygen in an autothermal reactor,
- v) using the hot synthesis gas emerging from the autothermal reactor to heat the jacket of the convective reformer,
- vi) further cooling the synthesis gas so that water is removed by condensation,
- vii) passing the de-watered synthesis gas to a Fischer-Tropsch reactor, recovering the desired higher hydrocarbons, forming a tail gas stream with the remaining components and passing at least a portion of said stream into the reforming (i.e. convective reforming + autothermal reforming) stage.

The subject-matter of claim 1 differs from this known process in that the tail gas stream is recycled precisely to the secondary reformer feed stream before the partial combustion stage.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as the provision of a process for the production of hydrocarbons, said process operating at low overall steam ratios without any risk of carbon deposition and low heat exchanger reformer costs.

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The solution disclosed in claim 1, i.e. the addition of Fischer-Tropsch tail gas to the primary reformed gas (= to the secondary reformer feed gas) before the partial combustion stage has neither been disclosed nor suggested in the prior art.

The subject-matter of claim 1 involves an inventive step (Article 33(3) PCT).

Claims 2-6 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.